



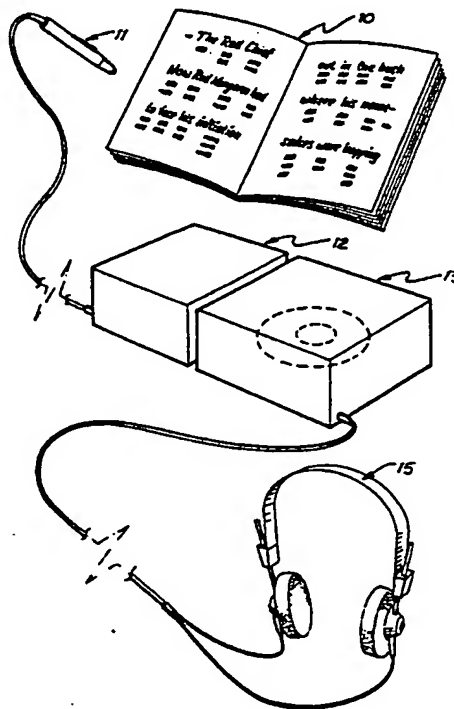
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification⁴ : G09B 5/06, 17/00	A1	(11) International Publication Number: WO 87/06752 (43) International Publication Date: 5 November 1987 (05.11.87)
(21) International Application Number: PCT/AU87/00127 (22) International Filing Date: 1 May 1987 (01.05.87) (31) Priority Application Number: PH 5684 (32) Priority Date: 1 May 1986 (01.05.86) (33) Priority Country: AU (71)(72) Applicant and Inventor: LLOYD, Trevor, Gwilym [AU/AU]; 34 Francis Greenway Drive, Cherrybrook, NSW 2120 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only) : MEE, David, Har- rold [AU/AU]; 2 Kelly Street, Henley, NSW 2111 (AU). BORODY, Thomas, Julius [AU/AU]; 14 Crown Road, Pymble, NSW 2073 (AU). (74) Agent: TERRY, John; Griffith Hassel & Frazer, G.P.O. Box 4164, Sydney, NSW 2001 (AU).		(81) Designated States: AT (European patent), AU, BE (Eu- ropean patent), CH (European patent), DE (Euro- pean patent), FR (European patent), GB (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European pa- tent), US. Published <i>With international search report.</i>

(54) Title: LANGUAGE TEACHING APPARATUS**(57) Abstract**

Language teaching apparatus comprising source material in the form of printed information (10) having written words associated with bar codes which are readable by a light wand (11) used to command a memory device such as a compact disk player (13) by way of an interface (12) to reproduce human voice sounds through headphones (15) corresponding to the words associated with the bar codes on the printed material (10). The bar codes may be provided at different levels in association with the written words and typically comprises:

(a) A first set of bar codes with one bar code causing a sentence of the text to be reproduced; (b) a second set of bar codes for causing individual words to be reproduced; (c) a third set of bar codes causing phoneme-related structural prompts to be reproduced; and (d) a fourth set of bar codes to cause an explanatory commentary on the meaning of selected words to be reproduced.



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"LANGUAGE TEACHING APPARATUS"TECHNICAL FIELD

The present invention relates to the teaching of language and more particularly is concerned with the correlation between the spoken word and the written word. The invention in various embodiments may be applied to teaching persons to read and may also be used in the teaching of foreign languages. However, the invention is not limited to these applications.

BACKGROUND ART

For effective learning, particularly of language, it is most helpful for a student to have the advantage of considerable attention, if not full time attention, of a teacher. For example, a young child will often learn to read by looking at a book containing pictures and corresponding words with an adult reading the words as the child follows the pictures and the words themselves. Thus, the mind of the child is focusing on an image depicting something, is being given the spoken word and is seeing the written word. Furthermore, from the context the child is absorbing the word within the scope of a grammatical structure and is gathering the meaning, either from the pictures if relevant or with the aid of explanation. At any stage the reader can discuss with the child any word or its meaning or draw to the child's attention a similar word and provide explanations and definitions of grammar and meaning, i.e. syntax and semantics.

Similarly, when a child is beginning to read, the adult can monitor the reading and provide immediate feed-back on a one-on-one basis to maximise the rate at which the child gains reading skills and remembers vocabulary. The interest and motivation of the child can be maintained at high levels. However, apart from a domestic situation, the cost of such teaching techniques make them prohibitive, yet there is a very substantial need, particularly in the areas of adult illiteracy and

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foreign language teaching.

Furthermore, similar needs for feed-back and flexible recapitulation of concepts, explanations and facts are needed in many other areas of education including
5 mathematics and other science subjects. The availability to a student of a teacher who can be requested to repeat an explanation, elaborate on some point of commentary or deal with any other relevant question is an extremely valuable resource in many situations.

10 It is known to assist students with e.g. tape recordings of explanation; when such tape recordings are applied to the process of learning to read, a simple system is one in which a tape recording of a printed work is given to the student and the student has the
15 opportunity of following the words, repeating segments of the tape recording and indeed recording his or her own attempts at reading the words and comparing with the tape recording of the tutor. However, such a system is inflexible and hard to operate.

20 One published approach to the teaching of language is contained in PCT International publication number WO 83/02188 (Merit Bond Limited) wherein printed text is provided with bar codes associated with at least some of the text, a manually controlled reading device used to
25 access the bar codes as the user may require, and an electronic processing means used to cause the apparatus to synthesise voice reproduction corresponding to the text with which the selected bar code is associated.

30 Such a device has limitations in terms of functions fulfilled.

The present invention is directed to a new combination of features which provides for a practical and useful teaching device which to a substantial extent simulates a one-on-one teacher student ratio.

35 DISCLOSURE OF INVENTION

According to a first aspect of the present invention, there is provided an apparatus comprising:

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source material for the student which is readable and has associated therewith at least two sets of machine readable labels which can be used to trigger a human voice message to the student of a different type depending upon the type of label accessed.

operator controlled reading means for reading any one of the labels,

message reproduction means for reproducing any chosen messages in any order from a store of messages corresponding to the labels, and

control means for causing an output signal to be given suitable for actuating a sound reproduction device to produce an oral message corresponding to the selected stored message.

The apparatus can be implemented in various different ways but the most preferred form is one in which the printed matter includes bar codes arranged on respective lines corresponding to lines of printed text, each bar code when accessed causing a particular storage location from the message store to be accessed and reproduced. A typical arrangement of bar codes in a preferred embodiment would be as follows:

(a) a first set of bar codes with one bar code causing a sentence of the text to be reproduced;

(b) a second set of bar codes for causing individual words to be reproduced;

(c) a third set of bar codes causing phoneme-related structural prompts to be reproduced; and

(d) a fourth set of bar codes to cause an explanatory commentary on the meaning of selected words to be reproduced.

The invention extends to printed matter comprising lines of text, a first set of machine readable labels associated with separate portions of the text, each portion comprising a multiplicity of words and at least one further arrangement of the labels corresponding to selected one or ones of said words and each of the labels

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being machine readable in any order to permit sequential accessing of human voice recordings at respective locations on a memory corresponding to a word or words as the case may be.

5 The invention also extends in another aspect to a method of teaching, comprising using an apparatus as described above, the student at his or her own pace reading words and selecting for reproduction the human voice representation of selected portions of the text
10 corresponding with machine readable labels.

BRIEF DESCRIPTION OF DRAWINGS

The invention will be further described, by way of example only, with reference to the accompanying drawings, of which:

15 Figure 1 is a schematic view of use of the present invention in one embodiment;

Figure 2 is a view of sample piece of printed text;

Figure 3 is a schematic diagram of the signal processing aspects of the apparatus;

20 Figure 4 is a diagram illustrating the instruction of principles in an interface for the apparatus.

MODES FOR CARRYING OUT THE INVENTION

Referring first to Figure 1, a book 10 is provided with individual pages of text and labels in the form of
25 machine readable bar codes, each page being typically as shown in Figure 2. The user has a light pen 11 adapted to be passed over selected bar codes, the pen being connected to an interface 12 which interprets the bar code as a location on a compact disk recording of human voice
30 corresponding to the words to which the selected bar code relates. The compact disk is mounted on a disk player 13 connected to the interface and adapted to be actuated by a signal from the light pen causing the selected word or words to be reproduced through headphones 15. The student
35 has at his or her command the ability to repeat words, phrases or sentences as the case may be, and in any order.

Referring now to Figure 2, the student can access a

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bar code 20 at the commencement of a sentence and cause reproduction of the whole sentence. Alternatively, the student can access a bar code underneath an individual word such as bar code 21 and will receive a human spoken message, a decyphering prompt, such as a suggestion to look for syllables within the word displayed; alternatively, the system can be set up to provide a real voice model for sounding out the word in question phoneme by phoneme.

10 The third group of labels 22 will give the student a real voice replay of the particular word.

 Optionally, a further label such as 23 can be provided which, when accessed by the user, will give an explanation of the word which may be in terms of its definition, mode of usage or other commentary.

15 When the apparatus is used for teaching a second language, the whole sentence can be reproduced in both languages in the correct idiom for each language using two bar codes at position 20. Each word can also be represented in each language, word for word, by two bar codes beneath the word. Where complex multisyllable foreign words are being taught, the word may be presented both in its normal pronunciation at normal diction speed, and also, by a further bar code, at a slowed down speed, enabling the student to dissect the pronunciation of the word syllable by syllable.

20 Although the information received from the light pen or wand 11 can be utilised to control the information on the compact disk in any convenient manner, one preferred way of processing the information from the bar codes will now be described with reference to Figure 3 which schematically illustrates one layout of the interface 12 between the light pen 11 and the compact disk player 13. The interface 12 is primarily controlled by a microprocessor 30 which is typically a Motorola 6809 integrated circuit provided with information from the bar code chip 31 which is typically an LTS-3 or 6801

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microprocessor. The bar code chip 31 converts the signals received from the light wand 11 to a read code in ASCII which is supplied to the microprocessor 30. The microprocessor is controlled by a program supplied by a ROM 32 and/or a RAM 33 to process the read code received from the bar code chip 31 and supply commands to the input output chip 6821 shown at 34. The chip 34 serves to control the compact disk player 13 to retrieve the desired information from a disk contained therein, and output that information to the headphones 15.

The control logic for the overall operation is diagrammatically shown in the flow chart in Figure 4.

For efficient arrangement in the apparatus, the sentences will normally be stored sequentially along a disk to minimise access time on the basis that the student is likely to progress through the text in sequence. Individual words, however, are arranged in separate index so that a particular common word appears only once instead of perhaps scores of times for word-by-word selection.

It will be appreciated the invention can be implemented in other ways. For example the labels need not be bar codes but could be any other form of machine readable labels such as magnetic coded material. Furthermore, the form of storage does not need to be on a compact disk but preferably rapid access of any one of a large number of selective storage designations is required.

Apart from teaching reading either in one language or in a second language, arrangements embodying the present inventive concepts can be applied to the teaching of braille, musical instruments by listening-based techniques, educational and information purposes where the user can use the label to access further information on selected points and even games.

It will be appreciated that use of the present invention obviates the disadvantages of synthesised voices which are poor in matching the cadences of the human voice.

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CLAIMS

1. Language teaching apparatus comprising source material for the student which is readable and has associated therewith at least two sets of machine readable labels which can be used to trigger a human voice message to the student of a different type depending upon the type of label accessed,

operator controlled reading means for reading any one of the labels,

message reproduction means for reproducing any chosen messages in any order from a store of messages corresponding to the labels, and

control means for causing an output signal to be given suitable for actuating a sound reproduction device to produce an oral message corresponding to the selected stored message.

2. Language teaching apparatus as claimed in claim 1 wherein the readable labels comprise bar codes and the operator controlled reading means comprise a light pen adapted to read the bar codes.

3. Language teaching apparatus as claimed in either claim 1 or claim 2 wherein the sets of machine readable labels comprise at least a first set directly corresponding to the pronunciation of the word associated with that label, and a second set giving explanatory material regarding the word or phrase associated with that label.

4. Language teaching apparatus as claimed in claim 3 wherein the second set of machine readable labels comprises two sub-sets namely a first sub-set providing information containing prompts relating to the word or phrase associated with that label, and a second sub-set giving a dictionary type definition of the word and/or phrase associated with that label.

5. Apparatus as claimed in any preceding claim wherein the readable source material is associated with bar codes arranged on respective lines corresponding to

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lines of printed text, each bar code when accessed causing a particular storage location from the message store to be accessed and reproduced.

5 6. Language teaching material incorporating printed matter comprising lines of text, a first set of machine readable labels associated with separate portions of the text, each portion comprising a multiplicity of words and at least one further arrangement of the labels corresponding to selected one or ones of said words and
10 each of the labels being machine readable in any order to permit sequential accessing of human voice recordings at respective locations on a memory corresponding to a word or words as the case may be.

15 7. A method of teaching language comprising using an apparatus as claimed in any one of claims 1 to 5 wherein the student at his or her own pace reads words and selects for reproduction the human voice representation of selected portions of the text corresponding with machine readable labels.

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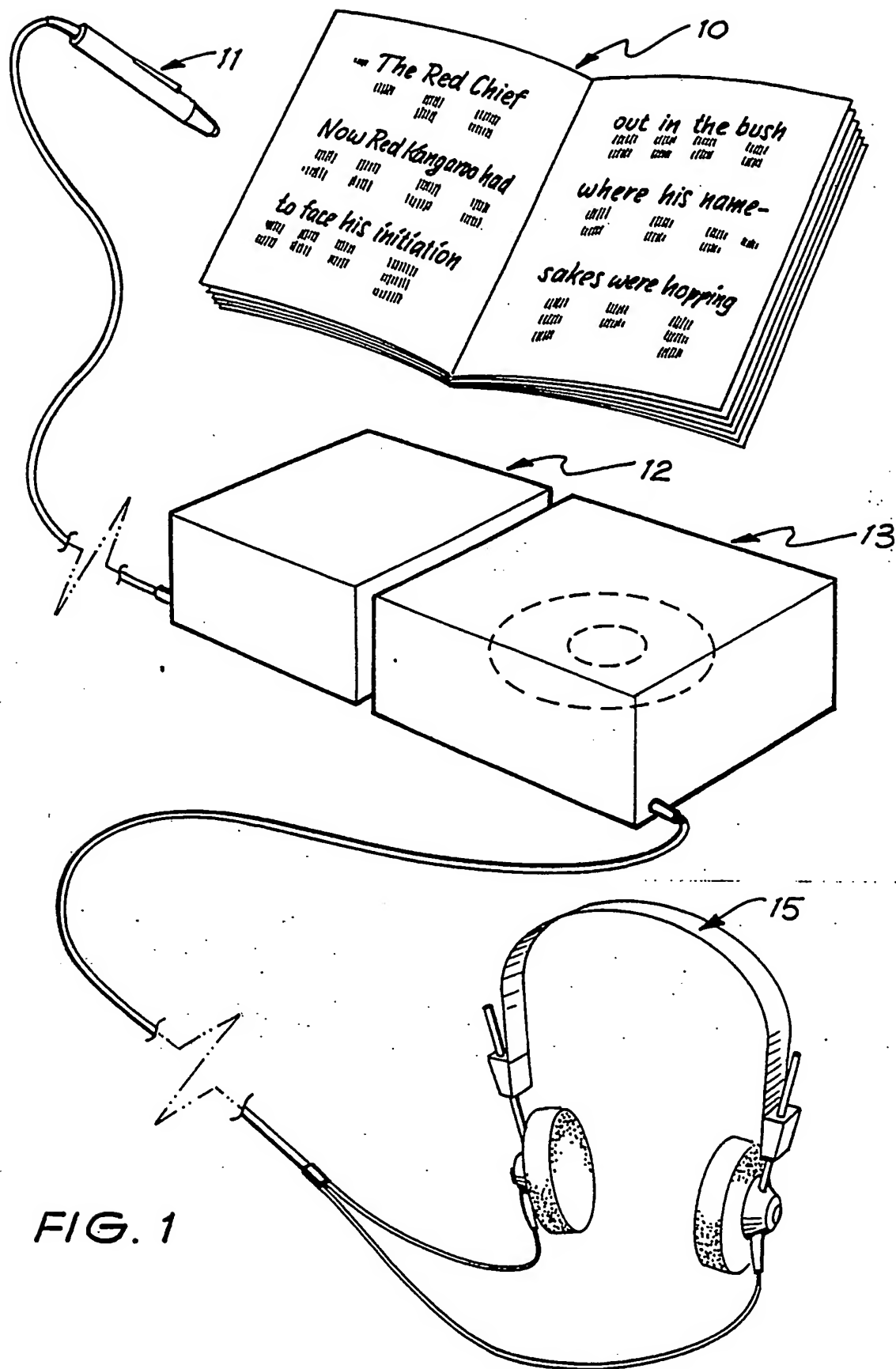


FIG. 1

SUBSTITUTE SHEET

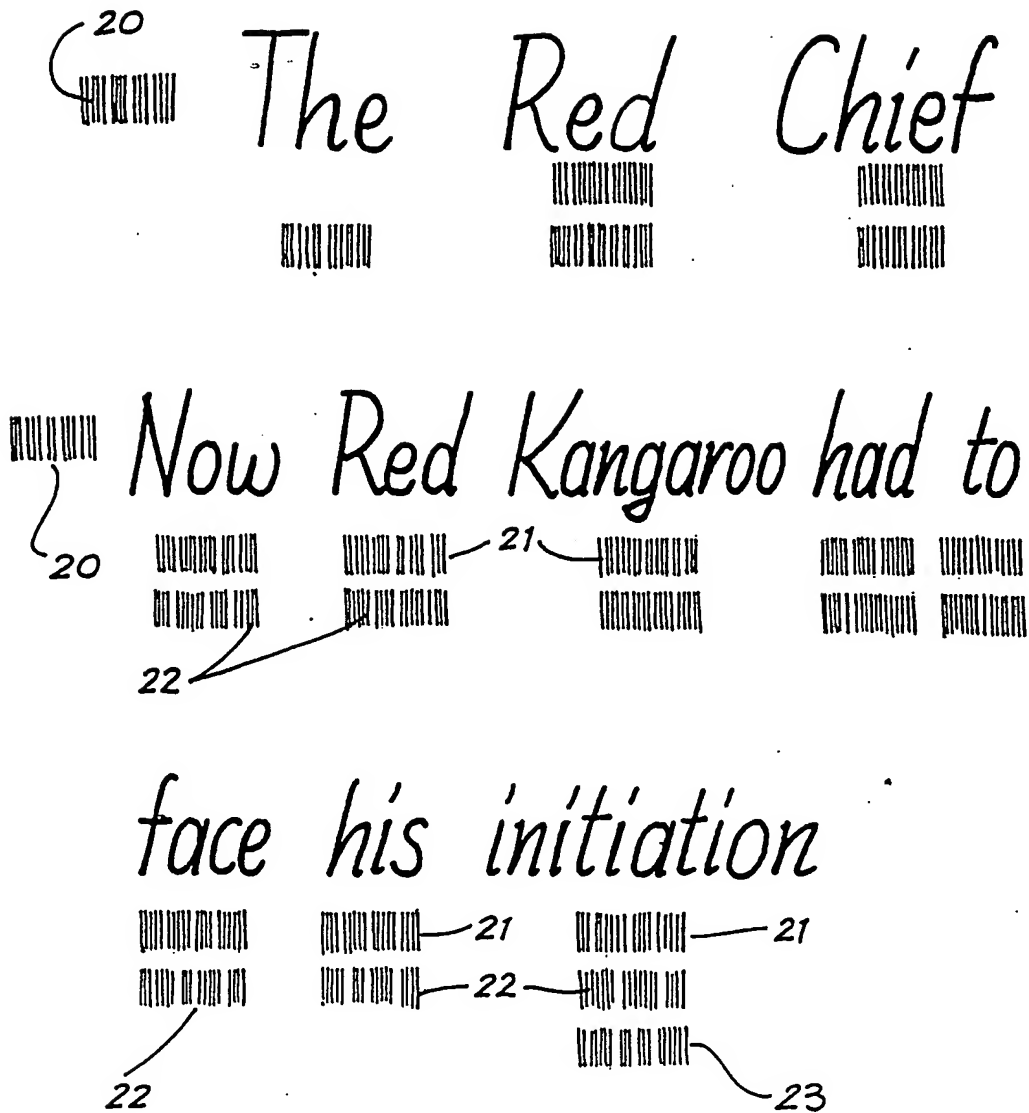


FIG. 2

SUBSTITUTE SHEET

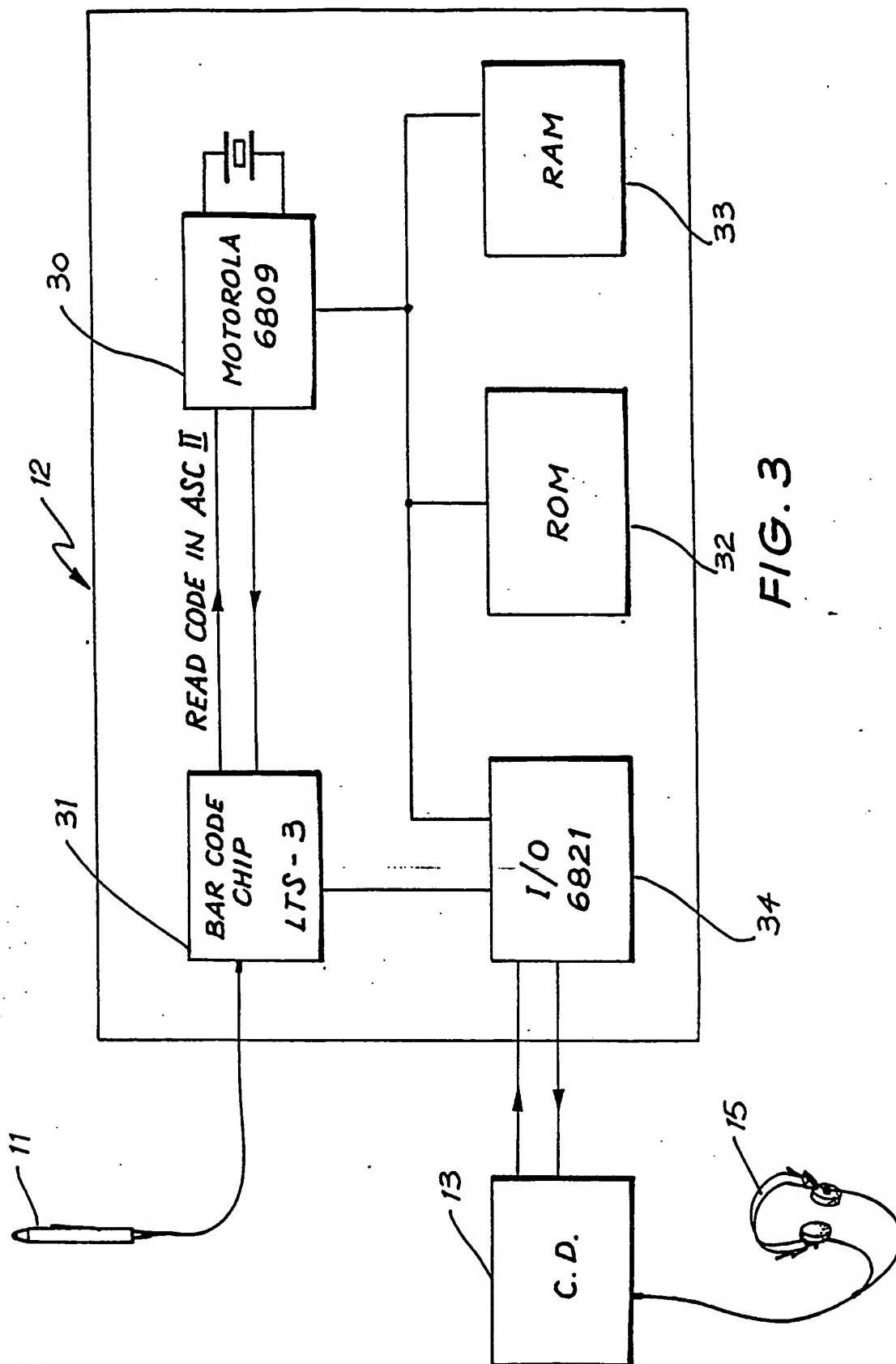


FIG. 3

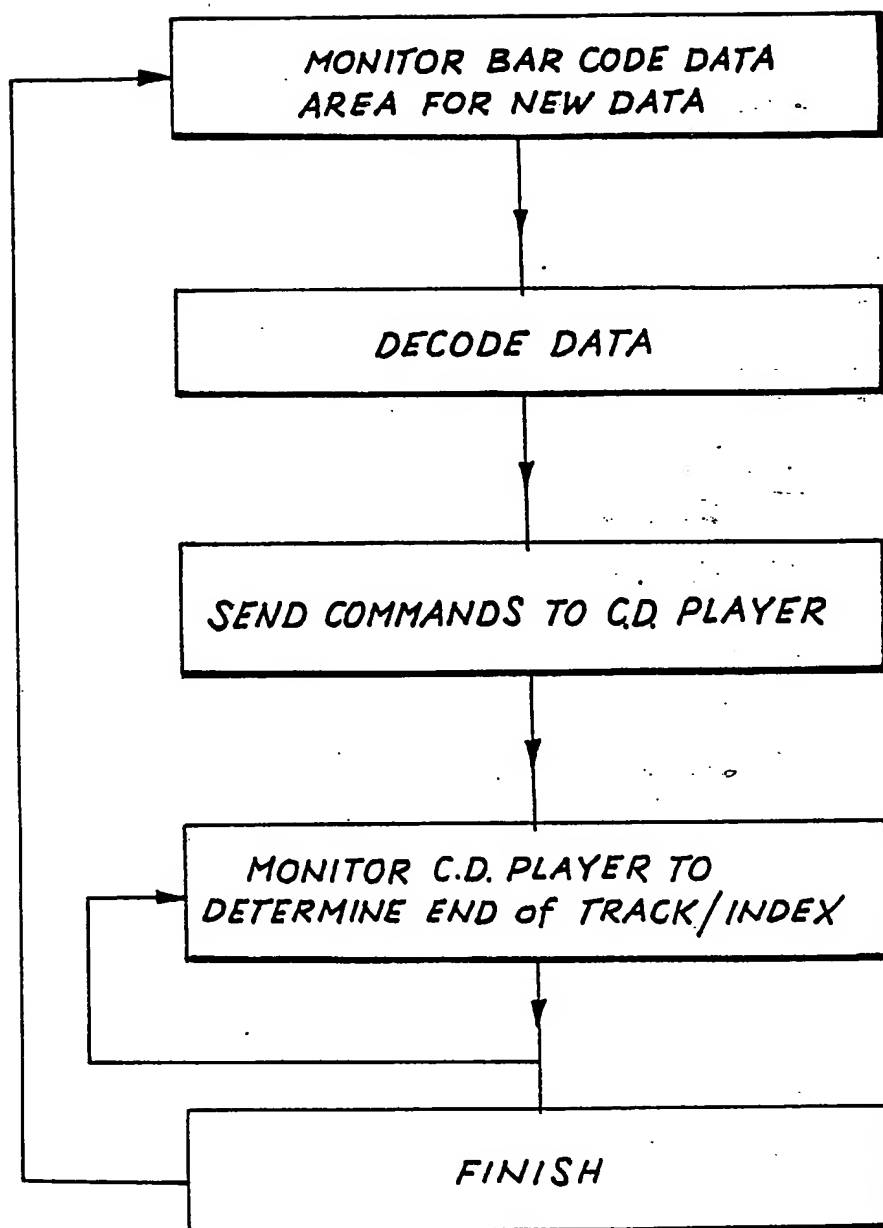


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 87/00127

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-size: 1.2em;">Int. Cl.⁴ G09B 5/06, 17/00</div>						
II. FIELDS SEARCHED <div style="text-align: center; font-size: 0.8em;">Minimum Documentation Searched ⁷</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; padding: 5px;">Classification System</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="text-align: center; padding: 5px;">IPC</td> <td style="padding: 5px;">G09B 5/06, 5/04, 17/00, G06K 9/18</td> </tr> </table>			Classification System	Classification Symbols	IPC	G09B 5/06, 5/04, 17/00, G06K 9/18
Classification System	Classification Symbols					
IPC	G09B 5/06, 5/04, 17/00, G06K 9/18					
<div style="text-align: center; font-size: 0.8em;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸</div>						
<div style="text-align: center;">AU: IPC as above; Australian Classification 54.41</div>						
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹						
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³				
X	AU,A, 11037/83 (MERIT-BOND LIMITED) 23 June 1983 (23.06.83)	(1,2,5)				
X	EP,A, 42155 (TEXAS INSTRUMENTS INC.) 23 December 1981 (23.12.81)	(1,2,5				
X	EP,A, 59318 (TEXAS INSTRUMENTS INC.) 8 September 1982 (08.09.82)	(1,2,5)				
X	EP,A, 95069 (TEXAS INSTRUMENTS INC.) 30 November 1983 (30.11.83)	(1-5)				
X	EP,A, 95139 (TEXAS INSTRUMENTS INC.) 30 November 1983 (30.11.83)	(1-5)				
X	GB,A, 2108747 (WESTERN PUBLISHING CO. INC.) 18 May 1983 (18.05.83)	(1,2,5)				
X	FR,A, 2452149 (SOCIETE ANONYME DITE: BERTIN & CIE) 17 October 1980 (17.10.80)	(1,2,5)				
Y	US,A, 3416241 (WEITZNER) 17 December 1968 (17.12.68)	(1,25)				
<div style="font-size: 0.8em;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div>						
IV. CERTIFICATION						
Date of the Actual Completion of the International Search <div style="text-align: center;">3 August 1987 (03.08.87)</div>	Date of Mailing of this International Search Report <div style="text-align: center;">(18.08.87) 18 AUGUST 1987</div>					
International Searching Authority <div style="text-align: center;">Australian Patent Office</div>	Signature of Authorized Officer <div style="text-align: center;"> A.J. EVANS </div>					

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. ☒ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹

This International search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claim numbers 6, 7, because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

The claim contains obscurities, inconsistencies and/or contradictions to the extent that it is impossible to arrive at a reasonable conclusion as to the scope of the claimed invention.

3. ☐ Claim numbers because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ²

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 87/00127

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members	
AU 11037/83	WO 8302188	EP	95493
EP 42155	US 4337375		
EP 59318	JP 57201963		
EP 95069	JP 59067569	US	4466801
EP 95139	JP 58218000		
GB 2108747	FR 2515391		

END OF ANNEX